SYNTHESIS, CHARACTERIZATIONS AND ANTI-CORROSION SCREENING OF SCHIFF BASE LIGAND WITH ITS Mn(II) COMPLEX

NOR AMIZA BINTI CHE'ZAMBELI

Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Chemistry
in the Faculty of Applied Sciences
Universiti Teknologi MARA

JULY 2017

This Final Year Project Report entitled **"Synthesis, Characterizations and Anti-Corrosion Screening of Schiff Base Ligand and its Mn(II) Complex"** was submitted by Nor Amiza Binti Che'Zambeli, in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry, in the Faculty of Applied Sciences, and was approved by

_____

Siti Noriah bt Mohd Shotor
Supervisor
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
Kuala Pilah Campus
72000 Kuala Pilah Negeri Sembilan

_____

Nurul Huda bt Abd Halim
Final Year Project Coordinator
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
Kuala Pilah Campus
72000 Kuala Pilah Negeri Sembilan

_____

Mazni bt Musa
Head of Programme
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
Kuala Pilah Campus
72000 Kuala Pilah Negeri Sembilan

Date : _____

TABLE OF CONTENTS

		Page
ACKNOWLEDGEMENT		iii
TABLE OF CONTENTS		iv
LIST OF TABLES		vi
LIST OF FIGURES		vii
LIST OF ABBREVIATIONS		ix
ABSTRACT		x
ABSTRAK		xi
CHAPTER 1 INTRODUCTION		
1.1	Background of Study	1
1.2	Problem Statements	6
1.3	Significance of Study	6
1.4	Objectives of Study	7
CHAPTER 2 LITERATURE REVIEW		
2.1	Synthesis of Schiff base ligand and metal complexes	8
2.2	Characterization of Schiff base and metal complexes	11
	2.2.1 Elemental Analysis	11
	2.2.2 Fourier Transform Infrared (FT-IR) Spectroscopy	13
	2.2.3 Molar Conductivity Measurement	16
	2.2.4 Ultraviolet-Visible (UV-Vis) Spectroscopy	18
2.3	Anti-corrosion screening	20
CHAPTER 3 METHODOLOGY		
3.1	Chemicals	24
3.2	Instrumentations and Techniques	24
3.3	Methodology	26
	3.3.1 Synthesis of ligand *N,N-Bis* (4-chlorobenzaldehyde-*o*-phenylenediamine (cbopd).	26
	3.3.2 Synthesis of complex Manganese(II) *N,N-Bis* (4-chloro benzaldehyde)- *o* -phenylenediamine dichloride dihydrate, [Mn(cbopd)].2H_2O.	27
	3.3.3 Corrosion Inhibition Screening	29
CHAPTER 4 RESULTS AND DISCUSSION		
4.1	Synthesis of ligand (cbopd) and its complex [Mn(cbopd)].2H_2O	31
4.2	Characterizations of cbopd and [Mn(cbopd)].2H_2O	33
	4.2.1 Elemental Analysis	34

4.2.2 Fourier Transform Infrared (FT-IR) Spectroscopy 34
4.2.3 Ultraviolet-Visible (UV-Vis) Spectroscopy 38
4.3 Corrosion Inhibiton Screening 40

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS
5.1 Conclusion 46
5.2 Recommendations 48

CITED REFERENCES 50
APPENDICES 53
CURRICULUM VITAE 63

ABSTRACT

SYNTHESIS, CHARACTERIZATIONS AND ANTI-CORROSION SCREENING OF SCHIFF BASE LIGAND WITH ITS Mn(II) COMPLEX

Synthesis of Schiff base ligand *N,N-Bis* (4-chlorobenzaldehyde)- *o* -phenylenediamine (cbopd) derived from *o*-phenylenediamine with 4-chlorobenzaldehyde and its complex Manganese (II) *N,N-Bis* (4-chlorobenzal dehyde)- *o* -phenylenediamine dichloride dihydrate, [Mn(cbopd)].$2H_2O$ was successfully done via condensation reaction. The color of the ligand and complex formed were yellowish and brownish precipitates respectively. Both of the cbopd and [Mn(cbopd)].$2H_2O$ were characterized by using Fourier Transform Infrared (FT-IR) and Ultraviolet-Visible (UV-Vis) spectroscopy, elemental analyses, molar conductivity measurement and melting point determination. The elemental analyses revealed the actual value of the compounds obtained are quite different with theoretical value. Based on the FT-IR spectrum of ligand, several peaks appeared at 1607 cm^{-1}, 3047 cm^{-1}, 1492 cm^{-1}, 830 cm^{-1} and 729 cm^{-1} have confirmed the presence of these major functional groups (*C=N*, *=C-H*, *C=C*, *para*-disubstituted and *Ar-Cl*) in the compound. Meanwhile, some of the peaks were shifted and a new peak were observed at 527 cm^{-1} in the FT-IR spectrum of [Mn(cbopd)].$2H_2O$ indicates formation of *M-N* bond. The melting point of cbopd and [Mn(cbopd)].$2H_2O$ were 176 °C and 230 °C respectively while molar conductance of [Mn(cbopd)].$2H_2O$ is 22.4 S cm^{-1}. For the UV-Vis, there are absorption peaks at 212 nm and 238 nm attribute to π–π* and 300 nm were attribute to n–π* for the free ligand while in the complex, the bands for n–π* electronic transitions was shifted to 320 nm and a new peak were found at 370 nm indicates ligand to metal charge transfer (LMCT). Next, both cbopd and [Mn(cbopd)].$2H_2O$ were used as a corrosion inhibitor for the mild steel immersed in three different concentrations of hydrochloric acid for 48 hours at 50 °C. Generally, inhibition efficiency was found to be higher when the concentration of inhibitor increased and [Mn(cbopd)].$2H_2O$ was found to be a better corrosion inhibitor than free ligand, cbopd.